

SCIENCE Assessment

Updates for 2011



Measurements of Student Progress

Science Grade 5

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Purpose and Highlights for Grade 5

Purpose: To provide information on changes and examples for the state science assessment.



New for 2011:

- Scenarios and items are based on the *Washington State K-12 Science Learning Standards* adopted in 2009. Sample scenarios and items for classroom practice are included in this document.
- The operational science test now includes completion items worth 1 point each along with multiple-choice (1-point) and short answer (2-point) items.
- Standard Setting events will be held in August 2011. Cut scores for the performance levels (Advanced, Proficient, and Basic) will then be established by the State Board of Education.
- Voluntary online testing is available.

Unchanged in 2011:

- The science test includes systems, inquiry, and application scenarios which reflect the cross-cutting concepts and abilities in our standards.
- Some stand-alone items also appear in the test. These items are not connected to a scenario, and this is clearly marked for students.
- Items previously asked in an extended response (4-point) format have been revised to a short answer (2-point) format.
- Pilot scenarios and items are embedded in the test, but not identified. Pilot items do not count towards student scores.
- The science test is a single, untimed, testing session.

2011 Testing Window:

- Paper and pencil: May 2—May 19, 2011
- Online: May 2—June 3, 2011

Points/Question Types Defined

Number of Questions and Points

Science – 2011			
	Grade 5 MSP	Grade 8 MSP	HSPE
Multiple-Choice/Completion	26	30	35
Short Answer	4	5	5
Total Items (Questions)	30	35	40
Total Score Points	34	40	45
*Pilot Items	5	5	5
Total Items on Assessment	35	40	45

* Pilot items are embedded in the assessment. These items are not included in student scores.

Question Types Defined

	Multiple-Choice (MC)	Completion (CP)	Short Answer (SA)
Point Value	1	1	2
Distinguishing Feature(s)	Students select their answer from among 3 choices (elementary) or 4 choices (secondary).	Students write or type a word or a short phrase inside a small box.	Students write their answer using sentences or phrases on lines inside a box, or type their answer into a textbox.

Test and Item Specifications

Test and item specifications provide guidelines for the development of scenarios and items for the science MSP and HSPE.

Please refer to the *Test and Item Specifications* documents for more information:

<http://www.k12.wa.us/Science/TestItemSpec.aspx>

Online Testing

The Measurements of Student Progress in Science will be offered online in 2011.

A Student Demo for science will be posted on the state's online-testing website early in 2011. The Student Demo allows students to view a demonstration of the testing software. The Demo can also be shared with parents and other interested community members.

A Science Tutorial will also be posted early in 2011. The Tutorial allows students to practice with the testing software, including navigating through the test and typing their responses to completion and short answer questions. The testing software must be loaded on the computer before using the Tutorial. Student responses are not saved or recorded. **The sample questions in the next section of this document are the same questions as those in the Tutorial.**

More information about online testing in Washington can be found at:

<http://www.k12.wa.us/assessment/StateTesting/OnlineTesting.aspx>

<http://wa-online.caltesting.org/>

Rollout Schedule for Online Testing

Science	Measurements of Student Progress		High School Proficiency Exam
	Grade 5	Grade 8	High School
2011	Goal: 25% Online	Goal: 25% Online	Paper/Pencil
2012	Goal: 80% Online	Goal: 80% Online	Goal: 50% Online

Introduction to Samples

Sample Scenarios and Items:

The sample scenarios and items in the Student Sample Pages (pages 7-19) provide teachers and students the opportunity to become familiar with the format of the three types of items on the assessment. All items are aligned to the *Washington State K-12 Science Learning Standards* (adopted 2009).

These scenarios and items will also be used in the online tutorials (to be released in early 2011).

The scenarios and short answer items included in this document have been previously released. However, adjustments have been made to the scenarios, multiple-choice items, and short answer items to ensure their alignment to the *Washington State K-12 Science Learning Standards* (adopted 2009). The completion items included here have not been previously piloted. These samples highlight important features of scenarios and the three item types.

The Teacher Answer Pages (pages 20-33) provide:

- Answer Key Table with:
 - Item Specification text
 - Item Specification code
 - For example: LS2A(2) is the second item specification for the content standard LS2A.
 - Correct answers for the multiple choice questions
 - Cognitive level of the questions, based on Webb's Depth of Knowledge*
- Rubrics for completion and short-answer items (student words are in *italics*)
- Annotated (scored) student responses for each of the short-answer items (student words are in *italics*)

* See Appendix A of the *Test and Item Specification* document for more information about cognitive levels.

Grade 5

Student Sample Pages



Directions: Answer questions 1 through 3 on pages 8 and 9. They are not connected to a scenario.

- 1** The Hubble Telescope is ten times more powerful than any telescope on Earth. How has this invention been helpful to scientists?
- ☐ A. The telescope provides a way to see the different layers inside Earth.
 - ☐ B. The telescope provides a way to see objects that are very far away.
 - ☐ C. The telescope provides a way to collect light energy from the Sun.
- 2** What is the function of skin on the human body?
- ☐ A. Skin has pores that help the body sense smells.
 - ☐ B. Skin protects the body from harmful substances.
 - ☐ C. Skin brings air directly into the body's bloodstream.

- 3 Which objects found in the school yard are living and which objects are nonliving?

Directions: Copy the names of the objects into the box labeled Living or the box labeled Nonliving.

	Living	Nonliving
Rock		
Beetle		
Plant		
Pop Can		
Grass		

Better Boiling

Directions: Use the following information to answer questions 4 through 8 on pages 12 through 15.

Joel heard that cold water will begin boiling (bubbling at the surface) faster than hot water when heated the same. He and his father did the following controlled experiment.

Question: What is the effect of different starting temperatures of water (5°C , 11°C , 51°C) on the time for the water to begin boiling?

Prediction: The lower the water's starting temperature, the quicker the water will begin boiling.

Materials:

empty cans of the same size labeled A, B, C

large pan

stove burner

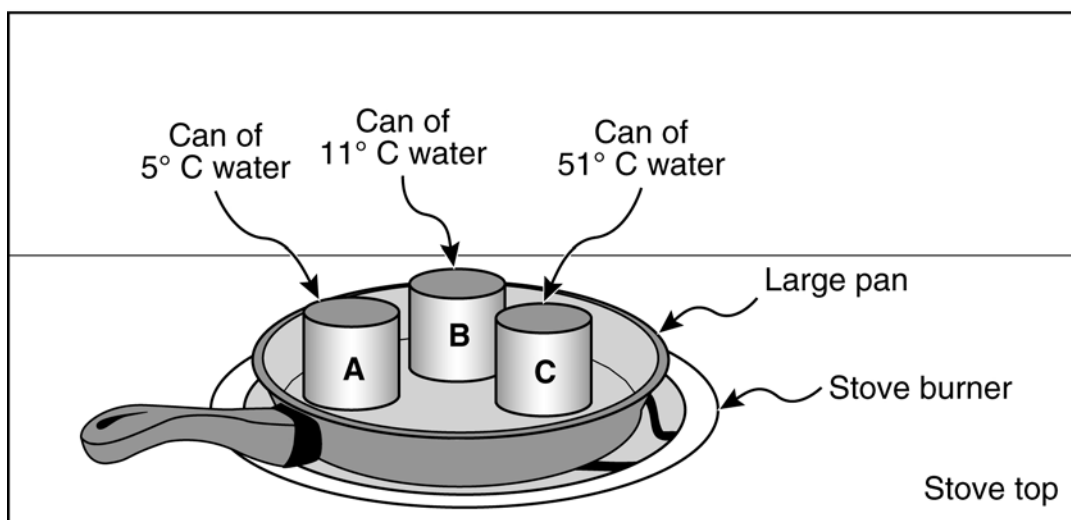
water (5°C , 11°C , 51°C)

beaker

thermometer

stopwatch

Controlled Experiment Setup



Procedure:

1. Put three empty cans into the large pan.
2. Pour 5° C water into Can A. Pour the same amount of 11° C water into Can B and the same amount of 51° C water into Can C.
3. Place the pan on the stove burner. Turn the burner on to medium heat.
4. Measure and record the time for the water to begin boiling in each can as Trial 1.
5. Turn the burner off, and let the pan cool.
6. Repeat steps 1 through 5 two more times as Trials 2 and 3.
7. Find and record average time for the water to boil for each starting temperature.

Data:**Starting Temperature vs. Time to Boil**

Starting Temperature	Time to Boil (seconds)			
	Trial 1	Trial 2	Trial 3	Average
5° C (Can A)	265	267	272	268
11° C (Can B)	257	252	253	254
51° C (Can C)	142	140	138	140

4 What variable was the measured (responding) variable in this experiment?

- ☐ A. Amount of water
- ☐ B. Time to boil
- ☐ C. Size of pan

5 What variable was the changed (manipulated) variable in this experiment?

Write your answer in the box.

--

6 Why did Joel repeat steps 1 through 5 two more times?

- ☐ A. To be sure the average time to boil was correct
- ☐ B. To fill out his data table with results
- ☐ C. To make the results fit his prediction

7 Write a conclusion for this controlled experiment.

In your conclusion, be sure to:

- Answer the experimental question.
- Include **supporting** data from the Starting Temperature vs. Time to Boil table.
- Explain how these data **support** your conclusion.

[illegible]

PAGE LEFT BLANK ON PURPOSE

- 8** Plan a controlled experiment to answer the question in the box. You may use any materials and equipment in your procedure.

In your procedure, be sure to include:

- logical steps to do the experiment
- one changed (manipulated) variable
- one measured (responding) variable
- how often measurements should be taken and recorded

Question: What is the effect of different amounts of water (100, 250,

500 milliliters) on the time for water to begin boiling?

Procedure:

[illegible]

The Birds

Directions: Use the following information to answer questions 9 through 11 on pages 18 through 19.

Tim's family moved to a new house with a fenced yard and a deck. The yard had no grass or plants. Tim helped his parents design a yard to attract birds and recorded the stages of their design process.

Problem: Attract birds to the yard.

Research the Problem: For two weeks, walk around the neighborhood for one hour each afternoon and record in the Bird Observations table what birds are seen doing.

Bird Observations

Where birds were seen	Bird actions; What birds were doing
Bird feeder in tree	Flew from tree branch to bird feeder, picked up seed, flew back to branch or ate seed on feeder
Neighbor's rooftop	Standing on roof, looking around
Telephone wires	Large group of birds perched on wire
Grassy area	Pecking grass and picking up worms, insects, and other things from the soil
Puddle of water	Drinking, jumping, splashing, and bobbing in the puddle
Flying in the air	Some birds flying with grass material dangling from beak; other birds circling and looking down
Sitting in the tree	Sitting in the tree and making birdcalls

Explore Ideas:

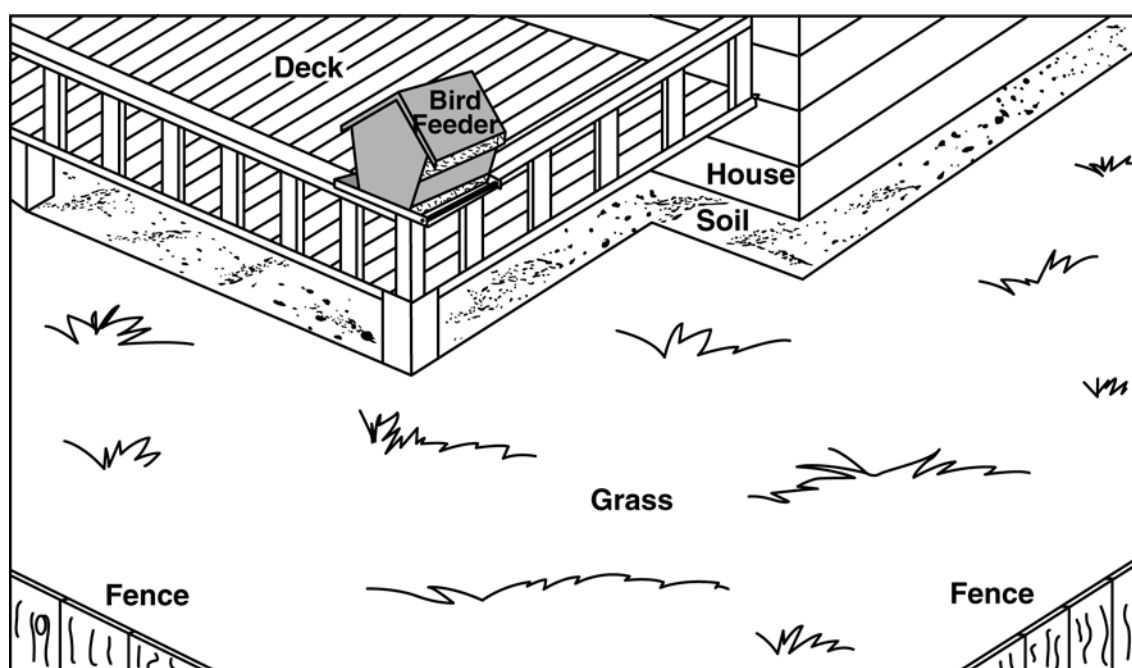
- ✓ Plant grass, flowers, shrubs, and trees.
- ✓ Put in a bird feeder, a birdbath, and birdhouses.
- ✓ Plan how to keep the plants healthy, the bird feeder full of seeds, and the birdbath clean and full of water.

Plan Summary: Plant grass for the birds to peck. Put in a bird feeder and keep the feeder full of seeds. Keep the fence clear for birds to stand or sit like birds do on rooftops, telephone wires, and trees.

Steps to Do the Plan:

1. Plant grass leaving bare soil under the deck and around the house.
2. Water the grass.
3. Buy a bird feeder and install on the deck rail as shown in the Diagram of Solution.
4. Keep the bird feeder full of seed.

Diagram of Solution:



Test Solution: Count the birds in the yard one hour every afternoon for two weeks.

Test Results: Only 10 birds landed on the fence, flew into the yard, or came to the bird feeder during the two weeks.

- 9** Tim wants to attract more birds to his new yard. To gather more information, which question should Tim research?
- ☐ **A.** When do birds in his neighborhood sleep?
 - ☐ **B.** What do the birds in his neighborhood eat?
 - ☐ **C.** What birds in his neighborhood sing the most?
-
- 10** What is the role of the birds in the yard ecosystem?
- ☐ **A.** Consumer
 - ☐ **B.** Decomposer
 - ☐ **C.** Producer

- 11** Tim observed many bird actions in his neighborhood. Describe why **two** of these bird actions are necessary for the birds to live.

In your description, be sure to:

- Identify **two** bird actions from the Bird Observations table.
- Describe **why** these bird actions are necessary for the birds to live.

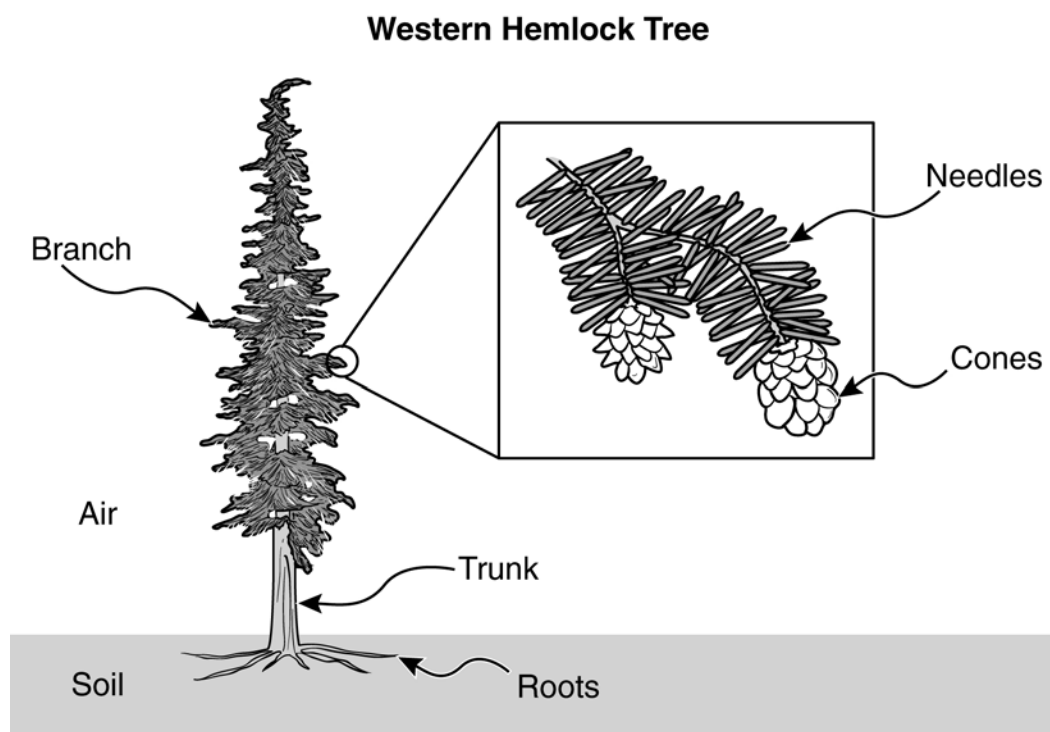
One action:
Another action:

State Tree

Directions: Use the following information to answer questions 12 through 14 on page 21.

The state tree for Washington is the western hemlock. The western hemlock tree is an important part of many forest ecosystems in Washington State.

The seeds of a hemlock tree can be found in the cones made by the tree. The Western Hemlock Tree diagram shows the cones on the branches.



- 12** The leaves (needles) on one western hemlock tree look just like the leaves on another western hemlock tree. Why do all western hemlock trees have the same type of leaves?
- ☐ A. The shape and color keep insects from eating the tree.
 - ☐ B. The trees inherit their leaf shape and color from the parent trees.
 - ☐ C. The needle shape and color produces the right amount of shade for the trees.
- 13** Scientists want to know how to make western hemlock trees grow faster. Which evidence should they gather?
- ☐ A. The types of animals that live in western hemlock trees.
 - ☐ B. The time of year that western hemlock trees produce cones.
 - ☐ C. The amount of water that is needed by western hemlock trees.
- 14** A person's lungs help to take in air that people need to live. Trees also need air to live. What part of the tree helps the tree to take in air?
- ☐ A. Needles
 - ☐ B. Trunk
 - ☐ C. Cones

Grade 5

Teacher Answer Pages



Answer Key

Item Description		Item Specification Code						Answer	Cognitive Level**
Item Specification Text		Systems	Inquiry	Application	Physical Science	Earth/space Science	Life Science		
1	Describe ways people use technology to meet human needs or wants.			APPA (1)				B	1
2	Describe the function(s) served by a structure of an organism.						LS1B (1)	B	1
3	Identify one or more living and/or nonliving parts of a given ecosystem.						LS2A (1)	CP*	2
4	Identify the measured (responding) variable*** in a given description of a scientific investigation.		INQC (3)					B	2
5	Identify the changed (manipulated) variable*** in a given description of a scientific investigation.		INQC (2)					CP*	2
6	Describe that repeated trials are needed to be sure results are reliable.		INQE (1)					A	1
7	Generate a conclusion for a scientific investigation, including supporting data, given a description of and results from the investigation.		INQG (1)					SA*	3
8	Describe a plan to answer a given question for a controlled experiment.		INQB (1)					SA*	3
9	Describe research that would provide a better understanding of a given problem that can be solved using a technological design process.			APPC (2)				B	2
10	Compare/describe the role(s) of producer(s), consumer(s), and/or decomposer(s) in an ecosystem.						LS2C (3)	A	1
11	Describe a plant or animal response to an internal need.						LS1D (1)	SA*	2
12	Describe that many characteristics of an organism are inherited from the organism's parents.						LS3B (1)	B	1
13	Given a brief description of an investigation, identify the question being asked.		INQA (1)					C	2
14	Describe the function(s) served by a structure of an organism.						LS1B (2)	A	1

*Completion (CP) and Short Answer (SA) items are scored with rubrics. The rubrics and sample student responses with annotations are on the following pages.

**See Appendix A of the *Test and Item Specification* document for more information about cognitive level.

***A definition for the term *variable* will be included in a glossary for all students to reference during testing as follows: All the parts of a system that could be changed are called variables. In an experiment one variable is changed and another variable is measured. The rest of the variables are kept the same.

Scoring Rubric for Item 3: School Yard Objects*

Performance Description
<p>A 1-point response demonstrates the student understands the Content Standard LS2A: An ecosystem includes all the populations of living organisms and nonliving physical factors in a given area. Living organisms depend on one another and the nonliving physical factors in their ecosystem to help them survive. Item Specification 1: Identify one or more living and/or nonliving parts of a given ecosystem.</p> <p>Response identifies which objects are living and nonliving by sorting them as follows:</p> <p>Living: <i>Beetle, Plant, Grass</i></p> <p>Nonliving: <i>Rock, Pop Can</i></p>
<p>A 0-point response demonstrates the student has little or no understanding of the Content Standard.</p> <p>Sorting objects any other way.</p>

*NOTE: This item was not piloted and is included for demonstration purposes only.

Scoring Rubric for Item 5: Better Boiling Changed Variable*

Performance Description
<p>A 1-point response demonstrates the student understands the Content Standard INQC: An experiment involved a comparison. For an experiment to be valid and fair, all of the things that can possibly change the outcome of the experiment should be kept the same, if possible. Item Specification 2: Identify the changed (manipulated) variable in a given description of a scientific investigation.</p> <p>Response identifies what variable was the changed (manipulated) variable in this experiment by stating one of the following:</p> <ul style="list-style-type: none"> • <i>starting temperature</i> • <i>different starting temperature</i> • <i>temperature of the water</i>
<p>A 0-point response demonstrates the student has little or no understanding of the Content Standard.</p> <p>Size of cans</p> <ul style="list-style-type: none"> • <i>time to boil</i> • <i>size of the cans</i> • <i>pan</i> • <i>stove burner</i>

*NOTE: This item was not piloted and is included for demonstration purposes only. Additional creditable responses may be determined by a Range Finding Committee.

Scoring Rubric for Item 7: Better Boiling Conclusion (1st of 3 pages)

Performance Description	Attributes
<p>A 2-point response demonstrates the student understands the Content Standard INQG: Scientific explanations emphasize evidence, have logically consistent arguments, and use known scientific principles, models, and theories. Item Specification 1: Generate a conclusion for a scientific investigation, including supporting data, given a description of and results from the investigation.</p> <p>Example: <i>The higher the starting temperature of water, the faster the water boiled. Water at 5° C took 268 seconds to begin to boil. The 51° C water took 140 seconds to begin to boil. The 5° C water took 128 seconds longer to boil than the 51° C water.</i></p>	3–4
A 1-point response demonstrates the student has partial understanding of the Content Standard.	2
A 0-point response demonstrates the student has little or no understanding of the Content Standard.	0–1

Starting Temperature vs. Time to Boil

Starting Temperature	Time to Boil (seconds)			
	Trial 1	Trial 2	Trial 3	Average
5° C (Can A)	265	267	272	268
11° C (Can B)	257	252	253	254
51° C (Can C)	142	140	138	140

Scoring Rubric for Item 7: Better Boiling Conclusion (2nd of 3 pages)

Attributes of a Conclusion	
Note: The italicized print is the part of the “Example” that is credited for the attribute.	
Performance Description	Attributes
<p>Conclusive statement correctly answers the investigative question (or correctly states whether the hypothesis/prediction was correct): <i>The higher the starting temperature of water, the faster the water boiled.</i></p> <p>Attribute Notes:</p> <ol style="list-style-type: none"> 1. A vague conclusive statement (e.g., <i>the starting temperature of water did affect the time for the water to boil</i>) cannot be credited for this attribute, but other attributes can be credited. 2. A response with an incorrect conclusive statement or no conclusive statement may not be credited any attributes. 3. A response with both a correct and an incorrect conclusive statement (e.g., <i>the prediction was incorrect...the can A water boiled fastest</i>) cannot be credited for this attribute but other attributes can be credited, if separate from any contradictory statements. 	1
<p>Supporting data should <u>at least</u> be over the entire range of the conditions investigated. Thus the minimum reported data are the lowest and highest conditions of the manipulated variable for quantitative data (responding variable when manipulated variable information is descriptive).</p>	
Supporting data for 5° C water: <i>Water at 5° C took 268 seconds to begin to boil.</i>	1
Supporting data for 51° C water: <i>The 51° C water took 140 seconds to begin to boil.</i>	1
<p>Explanatory language, separate from the conclusive statement, is used to connect or compare the supporting data to the conclusive statement: <i>The 5° C water took 128 seconds longer to boil than the 51° C water.</i></p> <p>Attribute Notes:</p> <ol style="list-style-type: none"> 1. This attribute can only be credited when at least one numeric value (or the text from a descriptive data table) for the responding variable is included in the response. 2. A copy of the conclusive statement cannot be credited for explanatory language. However, a rephrased credited conclusive statement can be credited. 3. Explanatory language comparing the range of the manipulated and responding variables may be credited (e.g., <i>When the starting temperature was 5° C, the time to boil was longest, 268 seconds.</i>). 4. If a response misquotes trend data between the highest and lowest conditions (e.g., <i>the can B water boiled in 250 seconds</i>), this attribute cannot be credited. 5. Transitional words (e.g. <i>however, therefore, because, so, then, clearly, but</i>) cannot be credited as explanatory language even when added to a conclusive statement. 6. A compound sentence as a conclusive statement may be read as two separate sentences. 	1
Total Possible Attributes	4

Scoring Rubric for Item 7: Better Boiling Conclusion (3rd of 3 pages)

General Notes:

1. **Copying the Data Table:** Responses copying the whole data table verbatim may not be credited the supporting data attribute even with a correct conclusive statement and explanatory language.
 - a) For grades 4-5, a translation of the whole data table into sentences is acceptable.
 - b) For grades 6-8 and high school, a discussion of the whole data table **may** be acceptable when the data table is minimal with a very small number of data cells.
2. **Supporting Data:** Responses must give the precise numerical values or precise descriptive language from the data table for both the manipulated and responding variables.
 - a) Average data (if given) or data from the end of the investigation, must be included for grades 6-8 and high school.
 - b) For grades 4-5, consistent trial data, or data before the completion of the investigation when measuring a responding variable over time, can be credited.
 - c) Rounded numerical values cannot be credited. (e.g., 270 cannot be credited for 5° C Water). However, a zero after a decimal point may be omitted (e.g., N/A).
 - d) Units are not necessary for credit (e.g., 140 is acceptable for 140 seconds).
 - e) Minor language differences in descriptive data may be acceptable as decided in range finding (e.g., ice water, *really/very cold*, or Can A; cold water or Can B; and hot water or Can C can be used in place of 5° C water, 11° C water, and 51° C water, respectively).
 - f) For grades 4-5, the manipulated variable may be implied.
3. **Derived Data:** Responses giving their own derived data between conditions can be credited for supporting data **and** explanatory language (e.g., *The 5° C water took 128 seconds longer to boil than the 51° C water*).
 - a) When the derived data uses the lowest and/or highest conditions, one or both supporting data points can be credited.
 - b) Minor arithmetic errors in derived values are acceptable as decided in range finding.

Annotated example of a 2-point response to item 7.**7** Write a conclusion for this experiment.

In your conclusion, be sure to:

- Answer the experimental question.
- Include **supporting** data from the Starting Temperature vs. Time to Boil table.
- Explain how these data **support** your conclusion.

Question: What is the effect of different starting temperatures of
water (5° C, 11° C, 51° C) on the time for water to begin boiling?
<i>The Can C water boiled before the Can A water and the Can B water. The Can C water</i>
<i>took an average 140 seconds, the Can B water took 254 second, and the Can A water</i>
<i>took 268 seconds. The Can C water boiled 114 seconds faster than the Can B water</i>
<i>and 128 seconds faster than the Can A water.</i>

Annotations	Attributes	
Conclusive Statement: <i>The Can C water boiled before the Can A water and the Can B water.</i>	1	
Supporting data for 5° C water: ... <i>the Can A water took 268 seconds.</i>	1	
Supporting data for 51° C water: <i>The Can C water took an average 140 seconds ...</i>	1	
Explanatory Language: <i>The Can C water boiled ... 128 seconds faster than the Can A water</i>	1	
Total Attributes & Score Points		4 2

Annotated example of a 2-point response to item 7.**7** Write a conclusion for this experiment.

In your conclusion, be sure to:

- Answer the experimental question.
- Include **supporting** data from the Starting Temperature vs. Time to Boil table.
- Explain how these data **support** your conclusion.

Question: What is the effect of different starting temperatures of
water (5° C, 11° C, 51° C) on the time for water to begin boiling?
<i>It took the 5° C water 265 seconds to boil. While it took the 11° C water 257 sen. and</i>
<i>the 51° C water 142 senconds. Why the 51° C water was the fastes is because it was</i>
<i>already hot.</i>

Annotations		Attributes
Conclusive statement: ... 51° C water was the fastest ...		1
Supporting data for 5° C water: ... the 5° C water 265 seconds to boil. (Data from trial 1)		1
Supporting data for 51° C water: ... the 51° C water 142 seconds. (Data from trial 1)		1
Explanatory language: None		0
Total Attributes & Score Points		32

Annotated example of a 1-point response to item 7.**7** Write a conclusion for this experiment.

In your conclusion, be sure to:

- Answer the experimental question.
- Include **supporting** data from the Starting Temperature vs. Time to Boil table.
- Explain how these data **support** your conclusion.

Question: What is the effect of different starting temperatures of water (5° C, 11° C, 51° C) on the time for water to begin boiling?
<i>The starting temperature of the water affects the time it starts to boil because if you look at the data table the 5° C water boild 265 the first trial the 51° C water boild at 142 the first time and the 11° C water boiled at 257 the first trial.</i>

Annotations	Attributes	
Conclusive Statement: <i>The starting temperature of the water affects the time it (water) starts to boil ...</i> A vague conclusive statement: Attribute Note 1	0	
Supporting data for 5° C water: ... <i>the 5° C water boild 265 the first trial ...</i>	1	
Supporting data for 51° C water: ... <i>the 51° C water boild at 142 the first time ...</i>	1	
Explanatory Language: None	0	
Total Attributes & Score Points	2	1

Annotated example of a 0-point response to item 7.**7** Write a conclusion for this experiment.

In your conclusion, be sure to:

- Answer the experimental question.
- Include **supporting** data from the Starting Temperature vs. Time to Boil table.
- Explain how these data **support** your conclusion.

Question: What is the effect of different starting temperatures of
water (5° C, 11° C, 51° C) on the time for water to begin boiling?
<i>If the water is really cold then it will take a longer time to boil then the hotter</i>
<i>water. The time will be different because one of the cups is already hot so it wouldn't</i>
<i>take that long.</i>

Annotations	Attributes	
Conclusive Statement: ... <i>water is really cold then it (water) will take a longer time to boil then the hotter water.</i>	1	
Supporting data for 5° C water: None	0	
Supporting data for 51° C water: None	0	
Explanatory Language: None	0	
Total Attributes & Score Points		1 0

Scoring Rubric for Item 8: Better Boiling New Procedure (page 1 of 2)

Performance Description	Attributes
A 2-point response demonstrates the student understands the Content Standard INQB: Scientists plan and conduct different kinds of investigations, depending on the questions they are trying to answer. Types of investigations include systematic observations and descriptions, field studies, models, and open-ended explorations as well as controlled experiments. Item Specification 1: Describe a plan to answer a given question for a controlled experiment.	4-5
A 1-point response demonstrates the student partially understands the Content Standard.	2-3
A 0-point response demonstrates the student has little to no understanding of the Content Standard.	0-1

Attributes of a Procedure

Attribute Name	Description	Attributes
Changed (manipulated) Variable	Only one changed (manipulated) variable (different amounts of water) is identified or implied in the procedure or data table (if given).	1
Measured (responding) Variable	The measured (responding) variable (time for water to begin boiling) is identified or implied in the procedure or data table (if given).	1
Record Measurements	The procedure states or implies measurements are recorded periodically or gives a data table. Attribute Notes: 1. If artificial data for the responding variable is given, this attribute cannot be credited. 2. The phrase <i>take measurement</i> cannot be used to mean <i>record</i> .	1
Trials are Repeated	More than one trial for all conditions is planned, or implied in a data table, to measure the measured (responding) variable.	1
Logical Steps	The steps of the procedure are detailed enough to repeat the procedure effectively (examples of illogical steps: no ending time indicated; states <i>Set up as diagrammed</i> , but diagram is inadequate; recording vague data or results).	1
Total Possible Attributes		5

Scoring Rubric for Item 8: Better Boiling New Procedure (page 2 of 2)

General Notes:

1. **Inappropriate Procedures:** If the response does not plan an appropriate procedure for the given question, the response may not earn any of the possible procedure attributes.
Examples:
 - a) Repeats the procedure from the scenario
 - b) Measures only one condition (therefore cannot establish the controlled or manipulated variables)
 - c) Purposefully changes more than one variable simultaneously
 - d) Writes a procedure that is too vague to possibly be appropriate
 - e) Writes a prediction instead of a procedure
2. **Naming Attributes:** If the response names a bulleted attribute listed after “be sure to include:” without including that attribute in the procedure, the attribute cannot be credited. When a bulleted attribute is named and implied in the response, both must be correct to be credited.
3. **Clarifying Vagueness in Procedures:**
 - a) NA
 - b) Measuring a vague parameter (e.g., *the boiling* instead of time) may be credited as a manipulated or responding variable. However, a vague parameter is difficult to repeatedly measure, so the logical steps attribute cannot be credited.
 - c) The term “repeat” at the end of a step refers to that step only.
 - d) The term “repeat” as a separate step (or in a new paragraph) refers to the whole procedure.
 - e) The term “repeat,” when qualified, cannot be credited for multiple trials (e.g., *repeat if necessary*, *repeat as desired*).
 - f) A vague action that calls for the manipulated variable to be changed (e.g., *increase the water by 100 milliliters*) without indicating how many times, gives no end to the investigation so the logical steps attribute cannot be credited.
 - g) NA (High School only)
 - h) When a procedure conflicts with a given labeled diagram, the procedure is too illogical to be effectively repeated. Therefore, the logical steps attribute cannot be credited, but the procedure can be scored for attributes that are not in conflict.

Annotated example of a 2-point response to item 8.

- 8** Plan a controlled experiment to answer the question in the box. You may use any materials and equipment in your procedure.

In your procedure, be sure to include:

- logical steps to do the experiment
- one changed (manipulated) variable
- one measured (responding) variable
- how often measurements should be taken and recorded

Question: What is the effect of different amounts of water (100, 250, 500 milliliters) on the time for water to begin boiling?
Procedure:
<i>1) Put labels on 3 cans then fill A to 100ml, B to 250ml, and C to 500ml with water.</i>
<i>2) Put the cans on the large pan and put the pan on the stove burner and turn the stove on.</i>
<i>3) Time how much time it takes for each can of water to start boiling.</i>
<i>4) record time on data sheet.</i>
<i>5) Repeat steps 1-4 to more times for trials 2 and 3.</i>
<i>6) Find the average.</i>

Attribute Name	Credit	Annotation
Changed (manipulated) Variable	1	<i>1.... fill A to 100ml, B to 250ml, and C to 500ml with water</i>
Measured (responding) Variable	1	<i>3. Time how much time it (the water) takes for each can of water to start boiling.</i>
Record Measurements	1	<i>4. record time...</i>
Trials are Repeated	1	<i>5. Repeat steps 1-4 two more times ...</i>
Logical Steps	1	The steps of the procedure are detailed enough to repeat the procedure effectively.
Total Attributes	5	2 Score Points

Annotated example of a 2-point response to item 8.

- 8** Plan a controlled experiment to answer the question in the box. You may use any materials and equipment in your procedure.

In your procedure, be sure to include:

- logical steps to do the experiment
- one changed (manipulated) variable
- one measured (responding) variable
- how often measurements should be taken and recorded

Question: What is the effect of different amounts of water (100, 250, 500 milliliters) on the time for water to begin boiling?
Procedure:
<i>1. Put water in 3 cans, each can a different amount. 2. Put the cans in the pan and put it on the stove burner. 3. turn the burner on Medium. 4. start the stop watch. 5. Stop the watch when the water boils. 6. turn burner off and let pan cool off. 7. Repeat steps 1-6 for trial 2 and 3.</i>

Attribute Name	Credit	Annotation
Changed (manipulated) Variable	1	<i>1. Put water in 3 cans, each can a different amount.</i>
Measured (responding) Variable	1	<i>5. Stop the watch when the water boils.</i>
Record Measurements	0	None
Trials are Repeated	1	<i>7. Repeat steps 1-6 for trial 2 and 3.</i>
Logical Steps	1	The steps of the procedure are detailed enough to repeat the procedure effectively.
Total Attributes	4	2 Score Points

Annotated example of a 1-point response to item 8.

- 8** Plan a controlled experiment to answer the question in the box. You may use any materials and equipment in your procedure.

In your procedure, be sure to include:

- logical steps to do the experiment
- one changed (manipulated) variable
- one measured (responding) variable
- how often measurements should be taken and recorded

Question: What is the effect of different amounts of water (100, 250, 500 milliliters) on the time for water to begin boiling?
Procedure:
<i>First, put the pan on the stove, Then you put different amounts of water in the cups and place them on the pan. Lastly, turn the stove on for awhile then look at witch amount of water affect the time.</i>
<i>REPEAT TRILES 3-5 TIMES.</i>

Attribute Name	Credit	Annotation
Changed (manipulated) Variable	1	<i>...different amounts of water in the cups...</i>
Measured (responding) Variable	1	<i>...look at witch amount of water affect the time.</i> Vague
Record Measurements	0	No record
Trials are Repeated	1	<i>REPEAT TRILES 3-5 TIMES.</i>
Logical Steps	0	Vague responding variable: General Note 3b.
Total Attributes	3	1 Score Points

Annotated example of a 1-point response to item 8.

- 8** Plan a controlled experiment to answer the question in the box. You may use any materials and equipment in your procedure.

In your procedure, be sure to include:

- logical steps to do the experiment
- one changed (manipulated) variable
- one measured (responding) variable
- how often measurements should be taken and recorded

Question: What is the effect of different amounts of water (100, 250, 500 milliliters) on the time for water to begin boiling?
Procedure:
<i>Put 100 milliliters of water in cup A, 250 milliliters of water in cup B and 500 milliliters of water in cup C. Measure the starting temperature. Place cups in pan and place pan on burner on Med. heat. Measure for the water to begin boiling.</i>

Attribute Name	Credit	Annotation
Changed (manipulated) Variable	1	100 milliliters of water ... 250 milliliters of water ... 500 milliliters of water
Measured (responding) Variable	1	Measure for the water to begin boiling Vague
Record Measurements	0	None
Trials are Repeated	0	None
Logical Steps	0	Vague responding variable: General Note 3b.
Total Attributes	2	1 Score Points

Annotated example of a 0-point response to item 8.

- 8** Plan a controlled experiment to answer the question in the box. You may use any materials and equipment in your procedure.

In your procedure, be sure to include:

- logical steps to do the experiment
- one changed (manipulated) variable
- one measured (responding) variable
- how often measurements should be taken and recorded

Question: What is the effect of different amounts of water (100, 250, 500 milliliters) on the time for water to begin boiling?
Procedure: 1. Pour some water into the pan.
2. Turn on the burner, when it get hot put on the pan.
3. Right when you put the pan turn on the stop watch.
4. When the water starts to boil stop the stop watch and record your data.
5. repeat steps 2-4, 2 more times for trial 2 and 3.

Attribute Name	Credit	Annotation
General Note 1b: Measures only one condition (some water).		
Changed (manipulated) Variable	0	
Measured (responding) Variable	0	
Record Measurements	0	
Trials are Repeated	0	
Logical Steps	0	
Total Attributes	0	0 Score Points

Scoring Rubric for Item 11: Interdependence of Life

Performance Description

A **2-point response** demonstrates the student understands the Content Standard LS1D: Plants and animals have structures and behaviors that respond to internal needs. Item Specification 1: Describe a plant or animal response to an internal need.

The response describes why **two** of the bird actions are necessary for the birds to live by:

Identifying **two** bird actions from the Bird Observations table

AND

Describing **why** these bird actions were necessary for the birds to live.

Examples:

Bird actions from table:	Why bird actions are necessary for birds to live:
<i>Flew from tree branch to bird feeder, picked up seed, flew back to branch or ate seed on feeder</i>	<i>All animals need to eat food for energy to survive</i>
<i>Standing on roof looking around</i>	<i>Looking for safety</i>
<i>Large group of birds perched on wire</i>	<i>Looking for food to eat</i>
<i>Pecking grass and picking up worms, insects, and other things from the soil</i>	<i>Getting food to eat</i>
<i>Drinking, jumping, splashing, and bobbing in the puddle</i>	<i>Birds need to clean themselves to live</i>
<i>Some birds flying with grass material dangling from beak; other birds circling and looking down</i>	<i>Birds can use grass material for nests for shelter</i>
<i>Sitting in the tree and making bird calls</i>	<i>Communicate to other birds</i>

A **1-point response** demonstrates the student has partial understanding of the Content Standard.

The response describes why **one** of the bird actions is necessary for the birds to live by Identifying **one** bird action from the Bird Observations table AND describing why **that** bird actions is necessary for the birds to live.

A **0-point response** demonstrates the student has little or no understanding of the Content Standard.

General Notes:

1. Bird actions should be recorded directly from the “What birds were doing; bird actions” column of the Bird Observations table. Some synonyms may be credited (e.g., *singing* for *bird calls*, *sitting* for *perching/standing*). A response may not combine two different bird actions from two different cells in the Bird Observations table (e.g., *pecking in the puddle*).

Annotated example of a 2-point response to item 11.

- 11** Tim observed many bird actions in his neighborhood. Describe why **two** of these bird actions are necessary for the birds to live.

In your description, be sure to:

- Identify **two** bird actions from the Bird Observations table.
- Describe **why** these bird actions are necessary for the birds to live.

One action: <i>was Jumping splashing in Puddles.</i>
<i>they do that a lot becuae they were bathing them selves to keep them clean or they</i>
<i>were just getting a drink.</i>
Another action: <i>Sitting in a tree bird calling.</i>
<i>The were probably doing that becuae they were calling for a mate or communicating</i>
<i>with other birds.</i>

Annotations	Score Point
One thing birds were doing: <i>was Jumping splashing in Puddles.</i> Why action is necessary: <i>...keep them (the birds) clean ..</i>	1
Another thing birds were doing: <i>Sitting in a tree bird calling.</i> Why action is necessary: <i>...calling for a mate...OR...communicating with other birds.</i>	1
Total Score Points	2

Annotated example of a 1-point response to item 11.

- 11** Tim observed many bird actions in his neighborhood. Describe why **two** of these bird actions are necessary for the birds to live.

In your description, be sure to:

- Identify **two** bird actions from the Bird Observations table.
- Describe **why** these bird actions are necessary for the birds to live.

One action: <i>They were standing on a roof looking around</i>
<i>It is necessary because there birds and they could see safe places and places</i>
<i>to find food.</i>
Another action: <i>hanging on the fence singing</i>
<i>birds like to sing and hang anywhere they want and they do that a lot because they like to do</i>
<i>that anytime.</i>

Annotations	Score Point
One thing birds were doing: <i>They (the birds) were standing on a roof looking around</i> Why action is necessary: <i>...see safe places ...OR...see... places to find food.</i>	1
Another thing birds were doing: <i>hanging on the fence singing</i> Note: Not found on Bird Observations table Why action is necessary: <i>...they (the birds) like to do that anytime.</i> Note: Does not explain how singing helps the bird survive	0
Total Score Points	1

Annotated example of a 0-point response to item 11.

- 11** Tim observed many bird actions in his neighborhood. Describe why **two** of these bird actions are necessary for the birds to live.

In your description, be sure to:

- Identify **two** bird actions from the Bird Observations table.
- Describe **why** these bird actions are necessary for the birds to live.

One action: <i>laying eggs</i>
<i>laying eggs so when it hatches they could live there</i>
Another action: <i>gettin use to the place</i>
<i>They were getting use to the place so they know where to go.</i>

Annotations	Score Point
One thing birds were doing: <i>laying eggs</i> Note: Not found on Bird Observations table Why action is necessary: ... <i>when it (the egg) hatches they (the bird) could live there</i>	0
Another thing birds were doing: <i>gettin use to the place</i> Note: Not found on Bird Observations table Why action is necessary: ... <i>know where to go.</i>	0
Total Score Points	0

Resources

Science Assessment Website: <http://www.k12.wa.us/Science/Assessments.aspx>

- The *Educator Resources* page contains updates and information about the rest of the site.
<http://www.k12.wa.us/Science/EducatorResources.aspx>
- The *Test and Item Specification* documents are located here:
<http://www.k12.wa.us/Science/TestItemSpec.aspx>
- The Powerful Classroom Assessments are located here:
<http://www.k12.wa.us/Science/PCAs/default.aspx>
Note: These documents match the 2005 GLEs and contain 4-point items, but are still useful for classroom practice and formative assessment.

Science Teaching & Learning Website: The science standards can be downloaded here: <http://www.k12.wa.us/Science/Standards.aspx>

Next Generation Science Standards

The National Academies website offers information on what is happening with science standards at the national level. The site has a *Frequently Asked Questions* section and a place to sign up for updates directly from the Academies.

http://www7.nationalacademies.org/bose/Standards_Framework_Homepage.html

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